

Closeout Report

on the

Director's Review

of

NuMI

February 12-13, 2004

Director's Review of NuMI Installation
February 12-13, 2004

REPORT OUTLINE

Executive Summary3

1.1 Main Injector, NuMI Stub, and Pre-Target Areas4

1.2 Target Hall and Service Rooms6

1.3 Absorber Area and Near Detector8

1.4 Integrated Schedule10

1.5 Integrated Safety Management12

1.6 Management13

Appendices

- A. Committee Charge
- B. Agenda
- C. Review Participants
- D. Table of Review Recommendations

Executive Summary

Tremendous progress has been made on the NuMI project since the April 2003 Director's Review of Installation Planning. The MI-65 Service Building and underground area beneficial occupancy was received in October 2003. Significant installation has been already accomplished in this area. The NuMI installation activities in the Main Injector, NuMI stub and pretarget areas went extremely well in the Summer 2003 accelerator shutdown. Alignment, vacuum, LCW, polarity-checking and instrumentation work remains in these areas. Installation planning has been / is being done for the remaining MI and MI-65 work. Beneficial occupancy of the MINOS Service Building and underground hall is scheduled for March 2004. Nearly all components of the Near Detector are on site ready for installation to begin in the underground hall. Installation planning has been / is being done for the Near Detector and Hadron Absorber. The Far Detector Assembly is complete and it is in a commissioning mode with cosmic rays. Finally, commissioning efforts to reach CD-4 were presented.

Recommendations from the April Director's Review and the November DOE Review have been addressed by the NuMI project. In some cases follow-up recommendations have been made and several recommendations ensuing from this review are made.

The NuMI project has identified critical path items for maintaining the early January 2005 first beam on target date. This requires some installations be accomplished in the Main Injector before the Summer 2004 shutdown. The most significant of these is installation of shielding around some NuMI magnetic elements. The committee urges AD and NuMI work to accomplish this and as many other early installation tasks as possible prior to the 04 shutdown.

1.1 Main Injector, NuMI Stub, and Pre-Target Areas

Findings

- The 2003 shutdown installation work was successfully accomplished.
- Installation work plans for 2004, both for the summer shutdown and for unscheduled shutdowns are formulated.
- Magnetic shielding is required for the six EPB dipoles. The NuMI Project places this shielding work as a very high priority.

Comments

- Congratulations on the successful completion of the 2003 shutdown work.
- The EPB shielding work is being pursued aggressively and a complete set of measurements will be done at the Magnet Test Facility. The committee agrees with the high priority of this work.
- The other magnets - ones that are not believed to be a problem for the Recycler - should be power-tested to verify that. This can be done at low average power, so that LCW is not required for these tests.
- To facilitate the power tests, and for similar activities, the project needs to become more integrated into the accelerator daily operations.
- The plans for the summer '04 shutdown are at this point a fairly "broad-brush" description of the work to be done, and indicates need for 8 of the 13 weeks of the shutdown. The schedule is resource-loaded but not resource-leveled. The schedule needs to be more fully developed if one is to have confidence that at the end of the shutdown, everything is ready for beam.
- Cable pulls are shown as taking the first week of the shutdown (except in the extraction kicker area).
- Alignment resources will, as always, be tight during the shutdown.
- The list of unscheduled shutdown activities identifies further alignment work to be done, that if not completed before the shutdown, will require additional time (and resources) during the shutdown.

Recommendations

1. Begin installation of the magnetic shielding once the design has been finalized and verified at MTF, but also factoring in other tasks such as vacuum, electrical and LCW connections which will be impacted by the presence of the shielding, polarity-checking, alignment, etc. The installation will be tricky and time-consuming, perhaps requiring field modifications without welding, burning or grinding, so it is important to install some small fraction so that the overall task can be more accurately estimated and scheduled. Determine, in consultation with the Recycler, Main Injector and

Director's Review of NuMI Installation
February 12-13, 2004

Operations Depts. what precautions need to be taken during shielding installation to protect the other machines from damage.

2. Appoint a "pre-commissioning czar" to interface with accelerator operations.
3. Power-test the other magnets which themselves or whose cables could affect the Recycler.
4. Continue refining the shutdown schedule(s). A single schedule which combines the unscheduled shutdown work, using hypothetical dates, with the summer shutdown, would be useful in conveying the full scope of work. Work with laboratory management to assure that time and resources are allocated for accomplishing the work.
5. Aggressively pursue alignment and cable pulls during the unscheduled shutdowns.

1.2 Target Hall and Service Rooms

Findings

- Good progress on fabrication and installation of the Target Hall area (and its technical components) has been made. This includes BO on 10/20/03 (20 days later than expected previously) and the critical path items (blue block installation, air block sheeting installation, and downstream shielding installation) are approximately 2 weeks ahead of the February '03 Master Schedule. Progress includes successful mounting of Horn 1 to its module (also ahead of schedule). Current progress indicates 4-6 weeks of float (February '03 Master Schedule).
- Horn Power Supply Lifting Fixture Review (recommended to be completed “in the near future” by the Director’s Review in April) is not yet complete, although Note preparation is in progress.
- MI-8 tech crew has been “protected” adequately from Shutdown work and other non-NuMI Target Hall tasks. Crane failure (shaft crane at MI-65) due to improper initial installation caused 2-day delay for repair.
- Video system needed for remote module handling with target hall crane has not been developed much beyond its status 2 years ago. For WBS 1.1.2, since installation activities have begun, actual costs have outpaced budgeted costs by approximately 25% and are expected to continue at this level until installation activities are complete. This is within the approximately 30% contingency assigned for these activities.
- Good management of these activities has been demonstrated (including the MI-65 Floor Managers) and results are obvious (good safety record, work ahead of schedule, quality of work).
- One of two contract techs in MI-8 crew is declared indispensable by Level 3 management and is requested to be extended through the end of FY 04.
- Air Handling equipment for the Target Chase is the last major procurement and is at the RFQ stage.
- At a conceptual level, goals of hot horn handling practice, fit-up of target to horn, remote camera system are clear. Detailed plans and procedures have not yet been developed.
- Once detailed, the hot horn handling practice needs for alignment may conflict with alignment needs during the '04 shutdown.

Comments

- Very impressive progress has been made on all fronts of the Target Hall installation. All of the personnel involved should be commended for their outstanding effort thus far.
- One of the recommendations from the April Director’s Review was answered by necessity when the shaft crane failed. It is encouraging to note that the repair time for the crane was held to 2 days.

Director's Review of NuMI Installation
February 12-13, 2004

Recommendations

1. Work with AD HQ and AD Mechanical Support to extend the contracts of needed technicians in the MI-8 tech group throughout the installation and hot horn handling phases.
2. Complete the horn power supply lifting fixture review as soon as possible.
3. Continue to “protect” the MI-8 tech crew from being diverted to non-NuMI Target Hall tasks. Obtain assurances from AD MS that the task manager for the Target Pile installation will be available for installation of the Target Hall air handling system, possibly during the '04 shutdown (M. Petkus).
5. Develop and procure needed equipment for remote handling of modules and technical components (remote cameras, fixtures, transmitters, etc.) as soon as possible.
6. Develop detailed list of target/horn installation, check-out, trouble-shooting and handling tasks that need to be performed during installation/hot horn handling practice as soon as possible.
7. Work with AD to co-ordinate alignment needs appropriately for Horn/Target installation and hot horn handling practice with other shutdown needs as soon as possible.

1.3 Absorber Area and Near Detector

Findings

- The installation of the absorber and the MINOS Near Detector are physically connected through their use of the MSB access shaft. Project Leaders have chosen to combine the installation projects for the absorber and the MINOS detector under one subproject manager.
- Key supervisory positions (including MINOS floor manger, transportation manager and task managers) have been identified and filled by experienced Lab employees.
- Design engineers continue to support installation activities.
- Weekly installation meetings involving all key members of the downstream installation team occur to help coordinate workflow.
- By scheduling the delivery of the shielding blocks ahead of the start of installation of the detector planes (first 2 weeks after Beneficial Occupancy), the obvious conflicts between the two parts of the project over the use of the access shaft are eliminated. The key to this plan is the staging of all blocks underground in the Access Tunnel while the piping contractors finish off work inside the enclosure.
- The core blocks of the absorber (2 aluminum and 3 steel sections) have been pre-assembled at MAB and a plan for assembly of the absorber and shielding is in place. The final geometry of the absorber enclosure allows for the use of more standard rigging equipment, although the project is still providing part of the lifting fixture. Design calculations for the cross beam have been checked and will be documented.
- A piping contractor, under the supervision of a Lab task manager, is responsible for completing the connections from the decay pipe cooling lines to the RAW skids. A Lab welder will work on attaching the decay pipe endcap. The decay pipe itself will be pumped down to operating vacuum levels (~1 Torr) prior to the start of absorber assembly. T&M riggers under the direction of a Lab Task Manager will be used to install the blocks and build the pile while a Lab welder will be responsible for connecting the core to the skid piping.
- Once the absorber shielding is completed, cracks between blocks will be sealed and Tyvek wrapped over the entire surface to retard air flow.
- The Absorber Area Project has several months of float in the schedule.
- The Near Detector Hall houses the main sump for the entire downstream area. The water influx is such that in the case of a sump pump failure, the hall will start to accumulate standing water on the time scale of a few hours.
- The MINOS Near Detector consists of 282 steel plates of which 153 include instrumented planes with either full or partial coverage.
- All planes are completed and are being staged in the New Muon Lab.
- The project has used the time between the completion of assembly of the detector planes and installation fixtures and the start of installation project to develop, debug and practice installation handling techniques and procedures.

- The planned pace of detector plane installation is 5 Spectrometer planes per day followed by 2 Calorimeter planes per day. Procedures for transporting and installing planes have all been tested in mock ups at NML.
- Detector plane check-out will occur on the evening shift by a crew of experimenters. Detector check out/QC procedures are still being developed. This check out will not affect the pace of plane delivery and installation.
- The MINOS Near Detector installation is scheduled to be completed in late November 2004.

Comments

- The relative importance of the sump system is quite different than most installations on Lab site. Extra care has been exhibited in designing a reliable system with several layers of redundancy.
- The limit of 24 total people in the Near Detector Hall and Absorber Enclosure represents a possible source of conflict. The Near Detector Floor Manager is charged with assuring that critical personnel have access to the area. The authority to force people to vacate the enclosures must be clearly communicated to all participants.
- The decay pipe represents a large surface area of “dirty” carbon steel pipe. It is possible that the pump down of the pipe will take longer than 2 days, as estimated in the work plan. This has implications for area occupancy and presents a schedule risk, although there are several months of float available.
- The combination of cramped quarters, heavy loads and wet, sloped surfaces makes the job of absorber shielding installation quite challenging. Due diligence should be exercised in evaluating the Hazard Analysis and in the execution of the work, particularly in the early stages of the project.
- The procedures for installation and checkout of the detector are established and have been exercised. There is still a need to provide formal and independent Quality Control checks to assure that techniques are being followed.
- The work plan for the Near Detector installation assumes a certain level of available resources (technicians) that is still being negotiated. Planning should include estimates of maximum possible needs to assure that rework scenarios, vacations or sick days can be accommodated.

Recommendations

1. Communicate with FESS the critical nature of the sump system and assure that all on-site support personnel are trained in the response procedures.
2. Develop a contingency plan to deal with the scenario of longer decay pipe pump down times.
3. Investigate the additional resources that could be available to fill in or add to the crew size and assure that they receive adequate training and hands-on practice with the lifting equipment.

Director's Review of NuMI Installation
February 12-13, 2004

1.4 Integrated Schedule

Findings

- NuMI takes management and oversight of the project schedule very seriously. The master schedule is under configuration control and is reviewed and updated monthly. Installation coordinators and Level 3 managers maintain detailed work plans that allow them to plan and manage activities within their areas.
- Weekly interface meetings between NuMI managers and installation coordinators, weekly area-specific installation meetings, and daily toolbox meetings appear to effectively communicate work plans and identify potential areas of conflict across the project.
- NuMI's level of importance with respect to other accelerator activities should be reinforced by the Fermilab Directorate. This will help the NuMI project complete critical tasks and achieve project milestones in coordination with other critical AD operations activities.
- The review committee recognizes that completion of several high priority tasks during unscheduled accelerator shutdowns this spring is critical to hold to the NuMI installation and commissioning schedule. These tasks include the installation of magnetic shielding around the EPB dipoles and installation of LCW valves and hoses. Completion of these tasks should be given equal importance to other work performed during unscheduled shutdowns

Comments

- NuMI management needs to review each of the high priority unscheduled shutdown tasks to ensure that they will be ready and able to deploy resources on short notice. This will enable the NuMI project to take full advantage of unscheduled shutdown opportunities.
- A detailed work plan should be developed for installing the magnetic shielding for the EPB dipoles. The plan should take into account means for protecting adjacent accelerator components during shield installation. The plan should be reviewed with Accelerator Division management to make sure that all safety and equipment protection concerns are adequately addressed. Acceptance of the plan will assure that shield installation can occur during unscheduled shutdowns without compromising accelerator startup.
- Installation of the EPB dipole magnet shielding should occur at least six weeks before the 2004 scheduled shutdown in order to allow for testing and shield redesign if necessary. Accordingly, it is important for accelerator operations to permit the installation of this shielding during unscheduled shutdowns that may occur this spring. The committee does not feel that the NuMI project will be ready to begin shield installation in the February 24 shutdown, but that the project should be prepared for any subsequent opportunity that arises.
- Installation of LCW valves and hoses, and commissioning of the LCW system, should be incorporated into unscheduled shutdown plans. This has potential for

Director's Review of NuMI Installation
February 12-13, 2004

- impacting MI operations. We understand the NuMI system is to be filled from the MI system requiring a large make-up and polishing. This clearly needs to be coordinated with the MI operational plans.
- Delivery of five profile monitors was identified as long-lead time and risky item. Although there is currently 2+ months of float to the August 23 shutdown, fabrication progress should be closely monitored to ensure that these monitors will arrive in time for adequate testing and evaluation.
 - The 2004 shutdown schedule should be updated to include all medium and low priority tasks on the “short shutdown” task list. Since there is a strong probability that these tasks will not be completed prior to the 2004 shutdown, inclusion into the 2004 shutdown schedule will provide a more realistic duration forecast.
 - What-if scenarios should be developed for the 2004 scheduled shutdown to reflect schedule duration based on resource availability. The current top-down 8-week schedule makes assumptions about resource availability that may not exist due to an anticipated shortage of critical resources (e.g. technicians and surveyors). The committee recognizes that a bottoms-up schedule is planned. We recommend that bottoms-up schedules be prepared to show best-case, worst-case, and best guess scenarios for completing planned shutdown work. This will enable NuMI to better understand and convey the impact of resource availability.

Recommendations

1. Review each high priority unscheduled shutdown task to ensure that materials and supplies exist and that personnel can be deployed to complete the work on short notice.
2. A detailed work plan should be developed for installing the magnetic shielding for the EPB dipoles that ensures personnel safety and provides for adequate protection of adjacent accelerator components. The plan should be developed in coordination with AD management.
3. AD operations should include installation of EPB dipole magnetic shielding in unscheduled shutdown plans such that this work occurs at least six weeks before the scheduled 2004 shutdown.
4. Installation of LCW valves, hoses, and cable pulls should be incorporated into unscheduled shutdown plans.
5. The delivery schedule for the five profile monitors should be carefully monitored.
6. The 2004 shutdown schedule should be updated to include all medium and low priority tasks on the “short shutdown” task list.
7. What-if scenarios should be developed for the 2004 scheduled shutdown to reflect schedule duration based on resource availability.

1.5 Integrated Safety Management

Findings

- All the pieces (project Personnel, Document Database) are in place.
- I.S.M. is evident at all levels of this project.
- The ES&H/QA Committee has been appointed and is working actively.
- The Shielding Assessment and Safety Assessment Document (SAD) are being written and a schedule for their review and approval is envisioned.

Comments

- 60% of the (known) NuMI documents have been approved.
- 15% of the MINOS documents have been approved.
- SAD and Shielding Assessment approval processes are time-consuming, often exceeding initial estimates.
- All accidents and injuries are treated seriously and remediation implemented.

Recommendation

1. Keep pushing the SAD and Shielding Assessment.

1.6 Management

Findings

- Critical positions required for NuMI Installation have been filled since the April Director's Review. The Floor Manager and Task Manager positions have been filled in the three geographical areas for NuMI Installation the Main Injector, MI-65, and MINOS areas. A Deputy Installation Coordinator was named, in place and played a key role in the successful Summer 03 Shutdown installation activities.
- The project is at a stage where NuMI activities can interact with and have an impact on accelerator operations. For example energizing a NuMI power supply took part of the complex down recently.
- NuMI personnel regularly attended the Daily 9 am Accelerator Planning Meetings during the Summer 2003 Shutdown, but have not attended regularly recently. This is a forum for discussing planned activities that impact accelerator operations.

Comments

- NuMI project personnel need to consider their planned activities for possible impact on accelerator operations and coordinate scheduling of these activities with AD Operations as appropriate.
- Resuming regular attendance and participation in the Daily 9 am Accelerator Planning Meetings would provide a forum for discussing, scheduling, and managing NuMI activities that can impact operations.

Recommendation

1. Resume regular NuMI attendance at the Daily 9 am Accelerator Integration Meetings.

Appendix A

Charge for a Director's Review of the NuMI Project February 12-13, 2004

This charge is for the Committee to conduct a Director's Review of the NuMI Project at Fermilab. This review will focus on installation planning, installation implementation and remaining equipment design, fabrication and testing.

NuMI received beneficial occupancy of the Target Area on October 20, 2003 and is currently performing installation work in this area. Beneficial occupancy of the MINOS Area is currently projected for mid March 2004 with the installation work commencing shortly after receiving occupancy. The remaining extraction and primary beam systems work is scheduled to be completed in the Summer 2004 shutdown.

The goal of this Director's Review is to assure that the NuMI team has the plans and resources in place to complete the installation work and commissioning in order to meet the CD-4 Start Operations milestone.

Therefore the NuMI presentations will include discussions of the stub, carrier tunnel and pre-target area, target hall and service rooms, absorber area and near detector with the inclusion of safety considerations for each area. The committee is requested to comment on the plans outlined by the presentations including the following topics:

- The technical and schedule risks inherent in the installation plan that could jeopardize the start of beam operations in February 2005.
- An assessment of the plans for meeting resource requirements to complete NuMI beam installation while simultaneously meeting accelerator operations and maintenance needs (this includes work in the summer 2004 shutdown and unscheduled shutdowns).
- NuMI's management of current installation work and plans for the future installation efforts.
- Overall safety issues should be assessed, including processes, procedures and their implementation.

This Director's Review should also assess how well the NuMI team has addressed the recommendations made in the April 8-9, 2003 Director's Review and the November 13-14, 2003 DOE Review.

Finally, the committee should present findings, comments, and conclusions at a closeout meeting with the NuMI and Fermilab management and provide a written report soon after the review.

Director's Review of NuMI Installation
February 12-13, 2004

Appendix B

Director's Review of NuMI February 12-13, 2004 Agenda

Thursday, February 12

8:30am	-	9:00am	Executive Session		
9:00am	-	9:15am	Introduction	R. Plunkett	15 mins
9:15am		9:30am	Civil Construction	D. Bogert	15 mins
9:30am	-	9:45am	Technical Components Status	B. Baller	15 mins
9:45am	-	10:00am	MINOS Status	R. Rameika	15 mins
10:00am	-	10:15am	Installation Overview	R. Andrews	15 mins
10:15am		10:30am	Break		
10:30am	-	10:45am	ES&H	M. Andrews	15 mins
10:45am	-	11:25am	Pre-Target & Target Hall Installation	S. Childress J. Hylen	40 mins
11:30am	-	12:30pm	Lunch		
12:30pm	-	1:10pm	Downstream Installation and Checkout	C. James P. Shanahan	40 mins
1:10pm	-	1:40pm	MI Installation and Checkout	R. Ford	30 mins
1:40pm	-	2:00pm	CD4 Commissioning	G. Bock	20 mins
2:00pm	-	3:00pm	Tour		

Friday, February 13

8:00am	-	10:00am	Potential Breakout Sessions
10:00am	-	12:00pm	Executive Session – Report Write-up
12:00pm	-	1:00pm	Working Lunch
1:00pm	-	2:00pm	Closeout Dry Run
2:00pm	-	3:00pm	Closeout with NuMI Management
3:00pm	-		Adjourn

Appendix C

Director's Review of NuMI February 12-13, 2004 Participants

Committee Members

Bill Boroski, FNAL
Chuck Brown, FNAL
Dean Hoffer, FNAL/OPMO
Pat Hurh, FNAL
Ioanis Kourbanis, FNAL
Phil Martin, Consultant
Rich Stanek, FNAL
Ed Temple, FNAL/OPMO, Chair

NuMI Presenters

Mike Andrews, FNAL
Rich Andrews, FNAL
Bruce Baller, FNAL
Greg Bock, FNAL
Dixon Bogert, FNAL
Sam Childress, FNAL
Rick Ford, FNAL
Jim Hysten, FNAL
Catherine James, FNAL
Rob Plunkett, FNAL
Regina Rameika, FNAL
Peter Shanahan, FNAL
Alan Wehmann, FNAL

Observers

Hugh Montgomery

**Appendix D – Table of Recommendations and Status
Director's Review of NuMI- February 12-13, 2004**

FINAL – 3/5/04

No	Responsible	Recommendations	Status	Date
<i>Section 1.1 – Main Injector, NuMI Stub, and Pre-Target Areas</i>				
1.1.1		Begin installation of the magnetic shielding once the design has been finalized and verified at MTF, but also factoring in other tasks such as vacuum, electrical and LCW connections which will be impacted by the presence of the shielding, polarity-checking, alignment, etc. The installation will be tricky and time-consuming, perhaps requiring field modifications without welding, burning or grinding, so it is important to install some small fraction so that the overall task can be more accurately estimated and scheduled. Determine, in consultation with the Recycler, Main Injector and Operations Depts. what precautions need to be taken during shielding installation to protect the other machines from damage.		
1.1.2		Appoint a "pre-commissioning czar" to interface with accelerator operations.		
1.1.3		Power-test the other magnets which themselves or whose cables could affect the Recycler.		
1.1.4		Continue refining the shutdown schedule(s). A single schedule, which combines the unscheduled shutdown work, using hypothetical dates, with the summer shutdown, would be useful in conveying the full scope of work. Work with laboratory management to assure that time and resources are allocated for accomplishing the work.		
1.1.5		Aggressively pursue alignment and cable pulls during the unscheduled shutdowns		

Director's Review of NuMI Installation
February 12-13, 2004

<i>Section 1.2. – Target Hall and Service Rooms</i>				
1.2.1		Work with AD HQ and AD Mechanical Support to extend the contracts of needed technicians in the MI-8 tech group throughout the installation and hot horn handling phases.		
1.2.2		Complete the horn power supply lifting fixture review as soon as possible.		
1.2.3		Continue to “protect” the MI-8 tech crew from being diverted to non-NuMI Target Hall tasks.		
1.2.4		Obtain assurances from AD MS that the task manager for the Target Pile installation will be available for installation of the Target Hall air handling system, possibly during the '04 shutdown (M. Petkus).		
1.2.5		Develop and procure needed equipment for remote handling of modules and technical components (remote cameras, fixtures, transmitters, etc.) as soon as possible.		
1.2.6		Develop detailed list of target/horn installation, check-out, trouble-shooting and handling tasks that need to be performed during installation/hot horn handling practice as soon as possible.		
1.2.7		Work with AD to co-ordinate alignment needs appropriately for Horn/Target installation and hot horn handling practice with other shutdown needs as soon as possible		
<i>Section 1.3 – Absorber Area and Near Detector</i>				
1.3.1		Communicate with FESS the critical nature of the sump system and assure that all on-site support personnel are trained in the response procedures.		
1.3.2		Develop a contingency plan to deal with the scenario of longer decay pipe pump down times.		
1.3.3		Investigate the additional resources that could be available to fill in or add to the crew size and assure that they receive adequate training and hands-on practice with the lifting equipment.		
<i>Section 1.4 – Integrated Schedule</i>				

Director's Review of NuMI Installation
February 12-13, 2004

1.4.1		Review each high priority unscheduled shutdown task to ensure that materials and supplies exist and that personnel can be deployed to complete the work on short notice.		
1.4.2		A detailed work plan should be developed for installing the magnetic shielding for the EPB dipoles that ensures personnel safety and provides for adequate protection of adjacent accelerator components. The plan should be developed in coordination with AD management.		
1.4.3		AD operations should include installation of EPB dipole magnetic shielding in unscheduled shutdown plans such that this work occurs at least six weeks before the scheduled 2004 shutdown.		
1.4.4		Installation of LCW valves and hoses should be incorporated into unscheduled shutdown plans.		
1.4.5		The delivery schedule for the five profile monitors should be carefully monitored.		
1.4.6		The 2004 shutdown schedule should be updated to include all medium and low priority tasks on the “short shutdown” task list.		
1.4.7		What-if scenarios should be developed for the 2004 scheduled shutdown to reflect schedule duration based on resource availability.		
<i>Section 1.5 – Integrated Safety Management</i>				
1.5.1		Keep pushing the SAD and Shielding Assessment.		
<i>Section 1.6 – Management</i>				
1.6.1		Resume regular NuMI attendance at the Daily 9 am Accelerator Integration Meetings.		